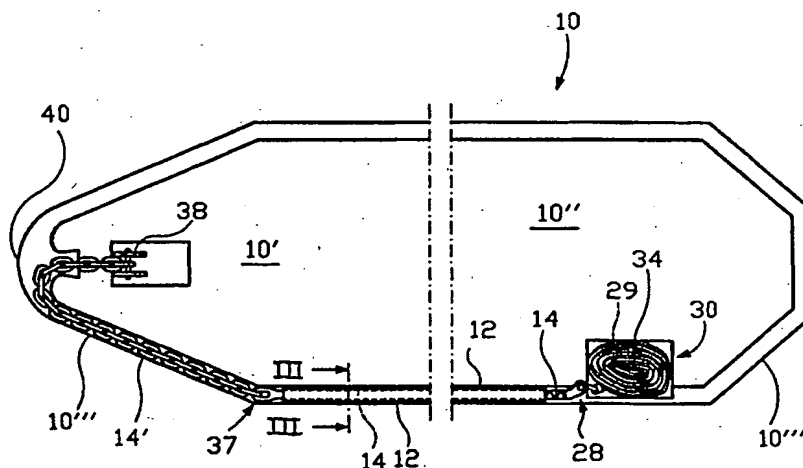


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(54) Title: ARRANGEMENT BY LARGE SHIPS, SUCH AS TANKERS, TO ENABLE OR EASE ESTABLISHMENT OF AT LEAST ONE TOWING LINE CONNECTION BETWEEN THE SHIP AND A TUGBOAT

**(57) Abstract**

A device by a ship (10), for example a tanker, which device is normally in a stand-by position to enable or facilitate the establishing of at least one towing hawser connection (14', 14, 28, 66, 64, 60) between preferably a damaged ship (10) and one or more tow/tugboats (54). For this purpose the ship (10) itself is equipped with at least one towing hawser (14', 14, 28) whose one end is preferably secured to a towing bracket (38), whereas the towing hawser (14', 14, 28) between the towing bracket (38) and the opposite, non-permanently anchored end (by 28) is placed, mainly in an extended condition, along part of the horizontal circumference of the ship, releasably retained in a stand-by position within at least one elongate retaining device (12) extending over a considerable part of the length of the towing hawser (14', 14, 28).

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ARRANGEMENT BY LARGE SHIPS, SUCH AS TANKERS, TO ENABLE OR
EASE ESTABLISHMENT OF AT LEAST ONE TOWING LINE
CONNECTION BETWEEN THE SHIP AND A TUGBOAT.

The present invention relates to a device by large ships,
5 e.g. tankers, which device has the purpose of enabling or
facilitating, in the case of an emergency or accident,
whereby the ship is subject to serious damage, the
establishment of at least one towing hawser connection
between the vessel and at least one tugboat, especially in
10 bad weather with rough seas on the site of wreckage, where
the ship may have run aground or is adrift.

On board a "dead", wrecked ship which is adrift or has taken
ground, and on which the sources of electric power are shut
down or do not work, it is practically impossible to make use
15 of the ship's deck equipment to heave and secure one or more
towing hawsers from towboats. Bad weather and rough seas
will, to a great degree, further complicate/render impossible
the transfer of the towing hawser(s) from the towboat(s) and
the securing of the free end of the hawser to the wrecked
20 ship.

However, in many cases it may be highly pressing to have wrecked ships towed away, in particular tankers transporting oil, by which the result of the wrecked ship "butting" against for example cliffs whereas the oil tanks are being punctured, may lead to enormous contamination of the sea and a corresponding natural disaster on shore by extensive oil spillage along the beaches.

Moreover, to have a damaged ship rescued before it is totally wrecked, will in most cases represent considerable values.

- 10 The purpose of the present invention is to enable the establishment of at least one towing hawser connection between a damaged, possibly "dead" ship and at least one tow/tugboat, also in bad weather with rough seas etc.

This purpose is realized according to the invention by a device, configured in accordance with the preamble section, exhibiting the features appearing from the characterizing part of claim 1.

The invention is based on the original idea of letting a ship be equipped with one or more towing hawsers, one end of the towing hawser being reliably secured - in connection with the positioning of the hawser in a stand by position on board the ship - to the ship, in the front or aft.

The major part of the length of the towing hawser may be formed by a steel rope with a core and twisted strands. The end portion up to the towing bracket may with advantage consist of a chain which is more pliable and flexible than a steel rope of towing hawser size, which will, of course, vary in size (diameter) according to the size and weight of the

ship. If the towing hawser extends essentially in a straight line, possibly by downward curvatures of so large radii of curvature that the inherent stiffness of the wire rope does not resist a certain gently curved course, the towing hawser may consist of steel rope throughout its length.

In normal conditions on board an undamaged vessel, the predominant length of the towing hawser, or each towing hawser, is retained in a stand-by position, easy to launch, whereby the hawser is received and releasably retained in a recess/profiled rail extending essentially in the circumferential direction of the ship, and said rail is provided with a tear-off wall, facing outwards from the adjacent side of the ship, which wall may be connected through spot welding, for example, or attached through another weakened connection to the rest of the profiled rail body, which may have, for example, a cross-section in the shape of a lying U, and which will exhibit, after the outer wall has been torn open, torn away and been removed, an opening which is directed laterally away from the adjacent side of the ship.

Instead of said wall, which is tearably/detachably connected through a weakening device to the rest of the U-rail-shaped profiled body, the free outer edges of the U-profiled rail may have opposing flanges screwed/ welded thereon, the screw connection or the welding being weakened, for example by the former comprising shear bolts, and the latter consisting of spot welds. The hawser, which is, of course, positioned prior to the screwing/welding on of said flanges or similar, is retained safely in the profiled rail as long as said flanges are intact, which they will be until there is a need for pulling the towing hawser out of the profiled rail, whereby a

considerable pull force is exerted essentially transversal to the longitudinal direction of the profiled rail, to tear away the flanges and gradually pull out the towing hawser.

This profiled rail or several such profiled rails are
5 conveniently arranged in, along or on top of the ship's rail, but in principle there is nothing to prevent the essentially horizontal groove of a U-shaped cross-section from being worked directly into the ship's frame, for example at the yard, and securing the outer skin plates around the U-
10 groove/-grooves, perhaps also within same. The outer tear-open wall/flanges close(s) the profiled rail completely or partially, with the towing hawser positioned therein, when it is/they are attached through the weakened securing connection to the U-rail. To tear the outer wall/flanges open, a pull
15 force is required, which has a vector effective transversely to the profiled rail, from within outwards, away from the adjacent side of the ship. Such a transversal force arises when a pull is exerted on that end of the towing hawser, which is not anchored to the ship, in a direction away from
20 the ship, in a typical case by a tugboat.

The free end of the towing hawser may have a solid loop or a similar annular securing means which lies relatively free, so that the loop of the towing hawser may be moved across to a towboat, either directly or by way of a helicopter. Such a
25 procedure is comparatively difficult in bad weather and rough seas, but it is still far easier than having the towing hawser of a tugboat transferred and secured to a "dead" ship. However, it may be connected with certain difficulties to have the end of the towing hawser transferred to the tugboat,
30 either directly or by way of a helicopter, but when that has taken place, the remaining operations do not involve any

particular problems on board the manned tugboat with intact deck equipment, winches etc.

However, the transfer of the towing hawser(s) from the damaged ship to the towboat(s) may be made considerably easier, if the free end of the towing hawser is connected to the end of a thinner pull wire which has sufficient tensile strength to contribute to the releasing and then to the pulling of the towing hawser. At its free end opposite the towing hawser end, the thinner pull wire may be equipped with a float buoy with an emergency light device. Such a light buoy is of course of the greatest importance if it can be thrown overboard before the crew leaves the damaged ship.

A further improvement of the towing hawser consists in the fact that the float buoy first mentioned, at the free end of the pull wire, is connected to an end of a thinner rope, preferably a floating rope, which may have a similar light buoy at its outer end. When the two light buoys have landed in the sea, they indicate where the floating rope is extended, namely from one light buoy to the other, and this facilitates to a great degree a rescue boat's work to catch the floating rope, to be able then to deliver it to a tugboat.

The floating rope and pull wire may, as a mere example, have a length of about 100-150 metres each. The floating rope should have a length which is sufficient to let the end of the pull wire be hauled over to the towboat, before the pulling out of the towing hawser from the profiled rail is to start, so that the pull wire, which is being wound on one of the winches of the boat, alone will serve to pull the towing hawser gradually out of its profiled rail and clear thereof,

and then across to the towboat, so that the towing hawser may be secured there before the towing of the damaged ship is started.

The connected floating rope and pull wire and the light buoys defining the floating rope may with advantage be placed in a box which can be easily opened, and which is mounted in the rail of the ship in the immediate vicinity of the non-anchored end of the towing hawser, which end is connected through a loop or other annular securing means to the free end of the pull wire, which is placed first in an orderly manner into the box with the first light buoy on top, after which the floating rope, which is connected by its one end to the first light buoy, is placed in an orderly manner into the box with the second light buoy on top.

An example of a possible embodiment of the invention is explained in further detail in the following and with reference to the accompanying drawings, in which:

Fig. 1 shows a partial view from above, of about half the contour of a larger ship, for example a tanker, in which there is arranged along the circumferential direction thereof, essentially in the longitudinal direction, preferably in the rail of the ship, a profiled rail which forms a kind of retaining case for the releasable retention of a towing hawser, whose one end is properly secured to a towing bracket in the front on the bow deck, and whose other end is secured to a pull line, which is placed together with a floating rope connected thereto, in a storage box or other container mounted by the ship's rail;

Fig. 2 shows, on a larger scale, a vertical sectional view through said storage box, which has an articulated lid, which in its inactive stand-by position covers an opening comprising the upper half of the box side facing the sea and the adjacent half of the top side of the box, the lid of the box having a handle which is upright in the closed position. This figure shows that the box contains a coiled pull wire at the bottom, and a connected, coiled floating rope on top, which floating rope is defined at either end by a light buoy, one end of the pull wire being connected externally with the non-anchored end portion of the towing hawser through a loop/ring or similar, its other end being connected to the first light buoy; the second light buoy is positioned on top and is connected to the free outer end of the floating rope;

Fig. 3 shows, on a larger scale, a vertical cross-section through the ship's rail with the towing hawser inserted in a profiled rail, which is provided, in this case, with a wall that may be torn open/off;

Figs. 4, 5, 6, 7 and 8 illustrate in a top plan view, the successive operational steps from the first step, in which the outer second light buoy is picked up for example by a rescue boat, to the last final working step, in which the towing has started, with three intermediate steps.

According to Fig. 1 a towing hawser has the length and tensile strength well suited for towing a ship 10 carrying it (and possibly one or more additional towing hawsers). The forecastle of the ship 10 is defined by 10' and the stern by 10". The towing hawser(s) are mounted in a releasable stand-by position in a recess or a profiled rail 12. A towing hawser 14 may with advantage be mounted into the ship's rail

16, at a distance above the deck 18, Fig. 3, but the profiled rail 12 may also be mounted on top of the rail.

According to Fig. 3, the profiled rail 12 is welded into the posts of the ship's rail 16 and is supported by special carrying brackets 20. The profiled rail 12 may consist of a lying U-rail with its opening directed outwards from the ship's side 10'''. This opening, facing outwards from the ship's side, serves to enable both insertion and extraction of the towing hawser 14 of the ship 10. The opening is closed at its upper edge by a wall 22. Below the bottom edge of the wall 22, after the insertion of the towing hawser 14, a vertical plate 24 is welded, extending almost all the way up to the upper wall 22. The lower vertical plate 24 which is at least as high as the diameter of the towing hawser 14, is welded, possibly spot welded 26 to the profiled rail 12. The individual strength of the weld 26 is adjusted on the basis of experiments and experience, so that the tear-open/tear-off plate 24 is reliably retained in position in normal conditions, but wherein the weld will form an intentional weakening device which will yield when subjected, in longitudinal sections thereof, to a mainly horizontal outward pull force (directed from the ship's side outwards) from a towboat which has had said pull wire brought aboard and is thereby tugging at the towing hawser. The opening between the upper wall 22 and the lower plate 24 may be sealed with a strip of jointing paste 27 to prevent water from entering. The profiled rail 12 may be filled with preservative fat to prevent rust damage on the towing hawser 14. At the end of the profiled rail 12, a towing eye (28) of the otherwise encased towing hawser is exposed and attached to the outer end of the pull wire 29, which is coiled from the bottom of a storage box 30 upwards, and whose second end preferably has a

first light buoy 32, on top of which is connected a coiled a floating rope 34 with an outer second light buoy 36. The opposite end of the towing hawser has an eyelet with a shackle 37. A chain portion 14' of the towing hawser passes through a tow-hole 40 in the bow 10' to a towing bracket 38. The chain portion 14' of the towing hawser has a considerably greater pliability/flexibility than the thick towing wire, and may therefore better take a curved course by the ship's bow or stern. The towing bracket 38 is secured to the deck by welding, with reinforcements down into the hull structure itself, so that there is provided a highly reliable securing of the end of the towing hawser on board the ship carrying the hawser(s). A further towing hawser may be arranged, suspended from a rail profile at the opposite side of the ship and with the end of the further towing hawser anchored to a towing bracket (not shown) located abaft.

Fig. 2 shows details of the storage box 30, incorporated at the ship's rail 16 and placed for example adjacent to the forecastle or the stern, but the positioning of the storage box 30 or another container/chamber is dependent on the length of the towing hawser 14 and its position relative to the length of the ship 10 and the position of the towing bracket 38.

The storage box 30 for the ropes 29, 34 and the light buoys 32, 36 may be replaced by any convenient container arranged to allow easy opening in a situation of distress. The box 30 according to the shown embodiment, Fig. 2, has the form of a parallelepiped, but might just as well have had the form of an upright cylinder. The reference numeral 10''' indicates the side of the ship, and the box 30 has a closable opening, whose one portion faces outwards from the ship's side 10''',

whereas its second opening portion, which is connected to the former opening portion, faces upwards. The former opening portion extends across approximately the upper half of said outward box side, whereas an upward opening portion extends
5 across approximately half of the upper surface of the box. The continuous opening is normally covered by a lid whose two sections 42', 42" are hinged together by means of a hinge 44 with a horizontal hinging axis. Moreover, the upper lid section 42" is hinged by its opposite edge to an adjacent
10 edge of a fixed upper wall portion 30' of the box 30, whereas the lower edge portion of the depending lid section 42' is formed with a rim portion 46 of an outward convex curvature. The pivot axis of the articulated lid 42', 42" is denoted by 48. The lid section 42" is provided with an upright handle
15 50, and the articulated lid 42', 42" is shown in its open position by dotted lines, Fig. 2. The storage box 30 stands on the deck 18 by leg elements 52', 52".

In the case of wreckage and the ship 10 remaining afloat, there will be time, in far the most cases, to get the box 30
20 open by gripping the handle 50, swinging up the lid 42', 42", to subsequently launch the uppermost, so-called second light buoy 36, which then pulls along a certain length of floating rope. If the ship must be abandoned immediately, without regard to the towing hawser connection, which it will later
25 be desirable to establish between the damaged ship and a towboat, personnel will possibly have to be put on board, maybe from a helicopter. This personnel will have the exclusive task of opening the box lid 42', 42" and launch said second float buoy 36 with a flashing light. As a last
30 possibility to establish a towing hawser connection between the wrecked ship 10 and a towboat or tugboat 54, the end loop or similar 28 of the towing hawser is freely accessible

outside the box 30. It is easier to catch and transfer the towing hawser end 28 of the ship 10 to a fully manned towboat with intact deck equipment, winches etc., than it would have been to have the towing hawser of a towboat 54 transferred and secured to a damaged, crewless ship 10 with non-functioning deck equipment, winches etc.

Fig. 4 illustrates in a schematic top plan view the individual steps of an envisaged sequence, from said second outer light buoy 36 being thrown into the sea and having pulled along the floating rope 34 and subsequently said second light buoy 32 and a minor piece of the pull wire 29, which is connected by its opposite end to the towing hawser 14. This situation is shown in Fig. 4, and, moreover, there is shown a rubber boat 56 which is about to pick up said second outer light buoy 36.

The second situation, Fig. 5, shows that said second outer light buoy 36 with part of the floating rope 34 has been brought aboard a towboat 54, on which the flowing portion brought aboard is about to be coiled by means of a rotary column 58 on the deck. The main winch of the tugboat 54 is indicated by 60, whereas a further winch is indicated by 62.

In the third situation, Fig. 6, it is shown that also said first intermediate light buoy 32 is brought aboard the tugboat 54, and a minor piece of the connected pull wire 29, which is connected to said further winch 62 to be wound thereon, and thereby pull the towing hawser 14 out of the channel 12 in the side of the ship.

In the fourth situation, Fig. 7, the end of the towing hawser has been brought aboard the towboat 54, and a pull/tow wire

64 which has sufficient tensile strength for it to participate in the towing of the ship 10, and which is wound on to the main winch 60 on the tugboat 54, is brought into a stand-by position with its end connecting organ in the form of a closable hook etc. 66, ready to be connected to the connecting piece 28 of the towing hawser 14.

In the fifth situation, Fig. 8, in which the towing hawser connection between the ship 10 and the towboat 54 is established and the towing is started, the pull force of the towboat 54 works via the tow/pull wire 64 of the tugboat 54 and the towing hawser 14, 14' of the ship 10 directly on the ship 10 via the towing bracket 32 at the bow.

After completed towing of the ship 10, the profiled rail(s) 12 will normally be intact for a towing hawser 14 to be inserted therein, after which the tearable/detachable vertical plate(s) 24 is (are) spot welded and the opening between the upper edge thereof and the lower edge of the wall 22 is jointed 27.

C L A I M S

1. A device by a ship (10), which device is normally in a stand-by position to enable or facilitate the establishing of at least one towing hawser connection (14', 14, 28, 66, 64, 60) between the ship (10) and one or more tow/tugboats (54), characterized in that the ship (10) is equipped with at least one towing hawser (14', 14, 28), whose one end is preferably secured to a towing bracket (38), whereas the towing hawser (14', 14, 28) between the towing bracket (38) and the opposite, non-permanently anchored end (by 28) is placed in an essentially extended condition along part of the horizontal circumference of the ship, releasably retained in a stand-by position in at least one elongate retaining device (12) extending over a considerable part of the length of the towing hawser (14', 14, 28).

2. A device according to claim 1, characterized in that the towing hawser (14', 14, 28) is constituted, over the predominant part of its length, by a towing wire (14), which is connected by one end to one end of a chain (14'), whose opposite end is secured to said towing bracket (38).

3. A device according to claim 1 or 2, characterized in that said elongate retaining device for the temporary retention of a predominant part of the length of the towing hawser, the towing wire part (14), is formed by an essentially horizontal lying U-profiled rail (12) with its U-opening directed outwards from the ship's side (10'''), the U-profiled rail (12) being mounted preferably in connection with the ship's rail (16), to which U-profile (12) is/are attached - after a considerable part of length of the towing

hawser (14) has been inserted in the cavity thereof - by a weakening device (26) one or more vertical plates (24) which has/have a height corresponding at least to the diameter of the inserted towing hawser (14), so that a transversal pull force acting on the towing hawser (14), represented by the pull from a tow/tugboat at the towing hawser (14) through a pull wire (29) connected thereto, could tear up/bend the weakening device (26) to gradually release said vertical plate(s) (24), and thereby allow the towing hawser (14) inserted in the cavity of the U-profiled rail (12) to be gradually extracted clear of the U-profiled rail (12).

4. A device according to claim 1 or 2, characterized in that the opening of the U-profiled rail (12) - after insertion of the hawser (14) in the cavity (68) of the U-profiled rail (12) - is partially closed by two opposing flanges attached by weakening devices.

5. A device according to claim 3 or 4, characterized in that said weakening devices consist of spot welds (26), shear bolts or other similar weakened securing means.

6. A device according to claim 1 or 2, characterized in that the connecting piece (28) of the towing hawser (14', 14, 28) is secured at its non-permanently anchored end to the end of a pull wire (29), which has sufficient tensile strength to participate in pulling the towing hawser (14, 14') itself up to the securing point (28, 66) on a tow/tugboat (54).

7. A device according to claim 6, characterized in a storage box (30) for orderly receiving said pull wire

(29), floating rope (34) and preferably two light buoys (32, 36), wherein one end of the pull wire (29), connected to said non-permanently anchored end (28) of the towing hawser (14), is positioned outside the box (30), but is otherwise coiled within the bottom portion thereof, whereas the floating rope 5 34 is coiled on a higher level with said second light buoy (36) lying on top, whereas said first light buoy (32) is positioned at the interface between the pull wire (29) and the floating rope (34).

10 8. A device according to claims 6 and 7, characterized in that the storage box (30) has a lid (42', 42") comprising two lid sections (42', 42") which are connected to each other by a horizontal hinge (44) and one depending lid section (42') thereof having a lower, free end 15 portion (by 46), whereas the free edge of the other horizontal lid section (42") is pivotally (by 48) connected to a second fixed upper wall portion (30') of the box, at least one (42") of the lid sections (42', 42") carrying a handle (50) to facilitate a swinging up of the lid and 20 folding of the lid sections (42', 42").

9. A device according to claim 1, characterized in that in at least in one side (10''') of the ship, there is incorporated a mainly horizontal, channel-like groove, which corresponds essentially to the cavity of the profiled 25 rail (12), and which is to replace the profiled rail (12).

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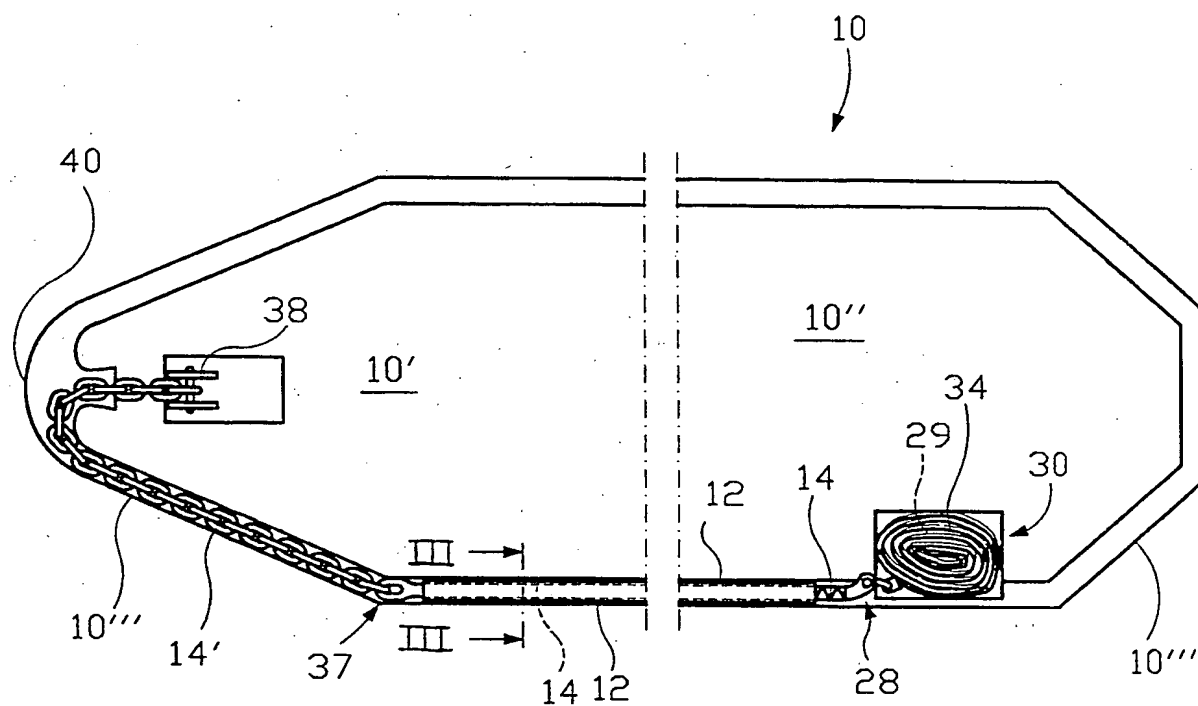


Fig. 1

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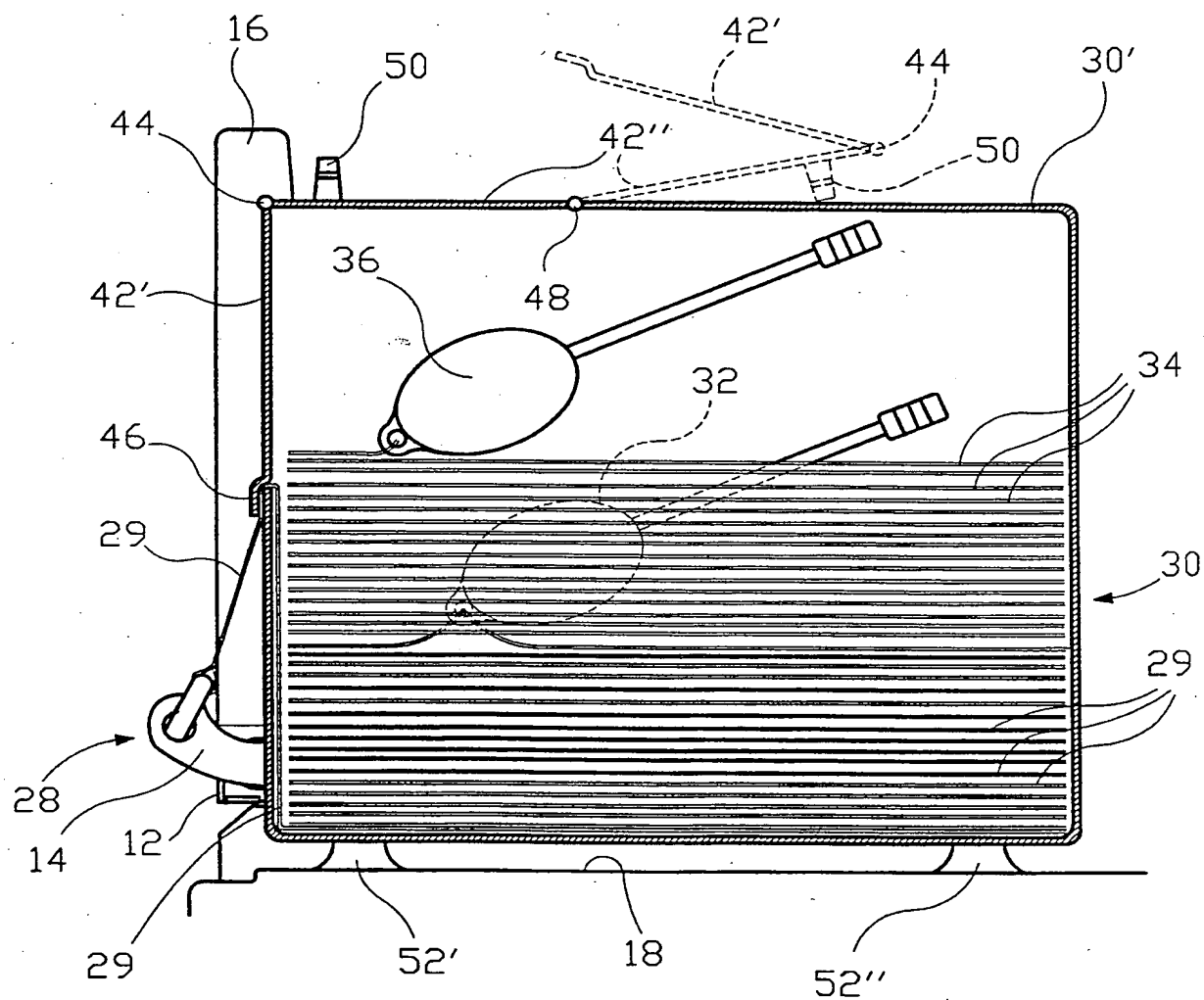


Fig. 2

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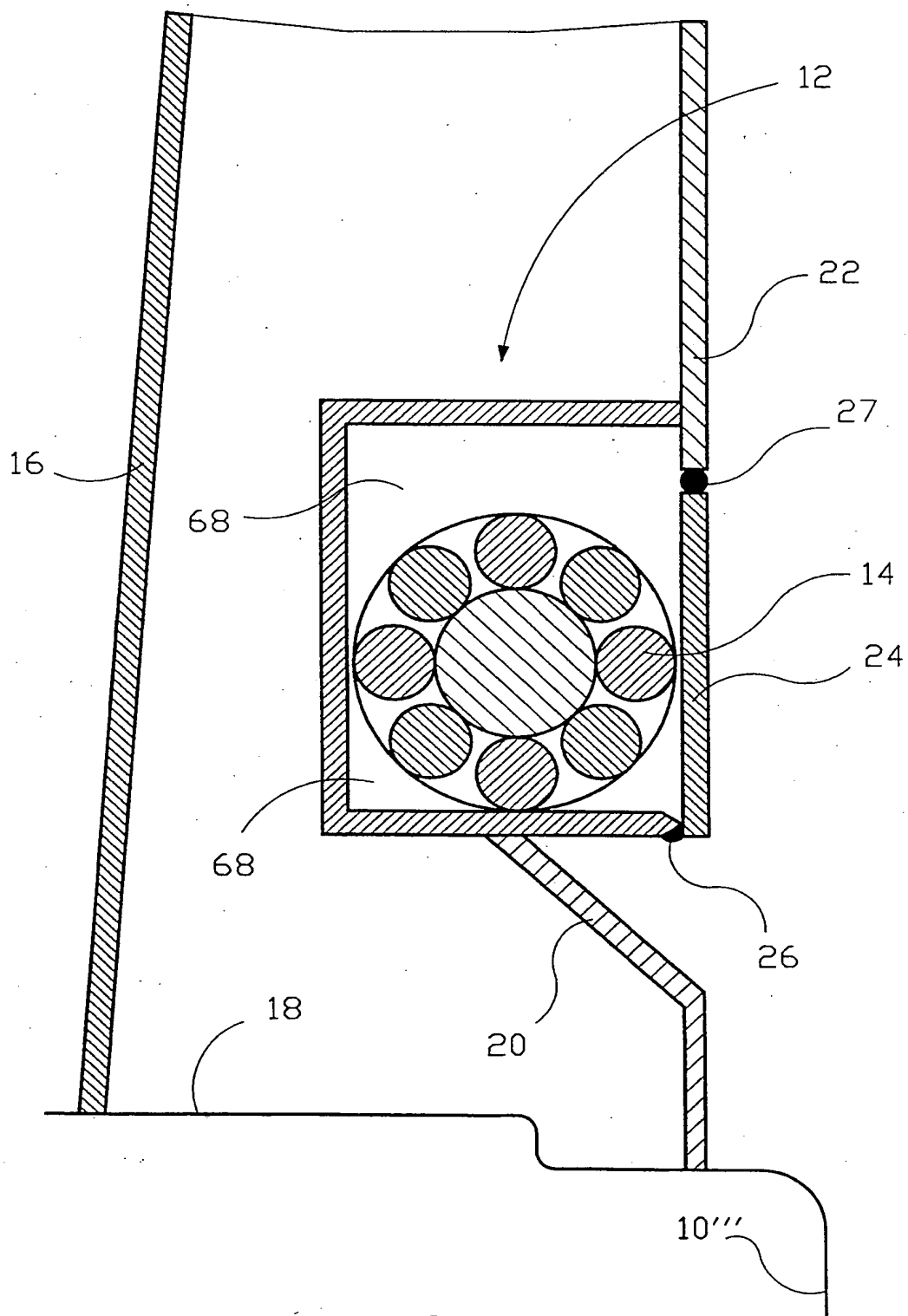


Fig. 3

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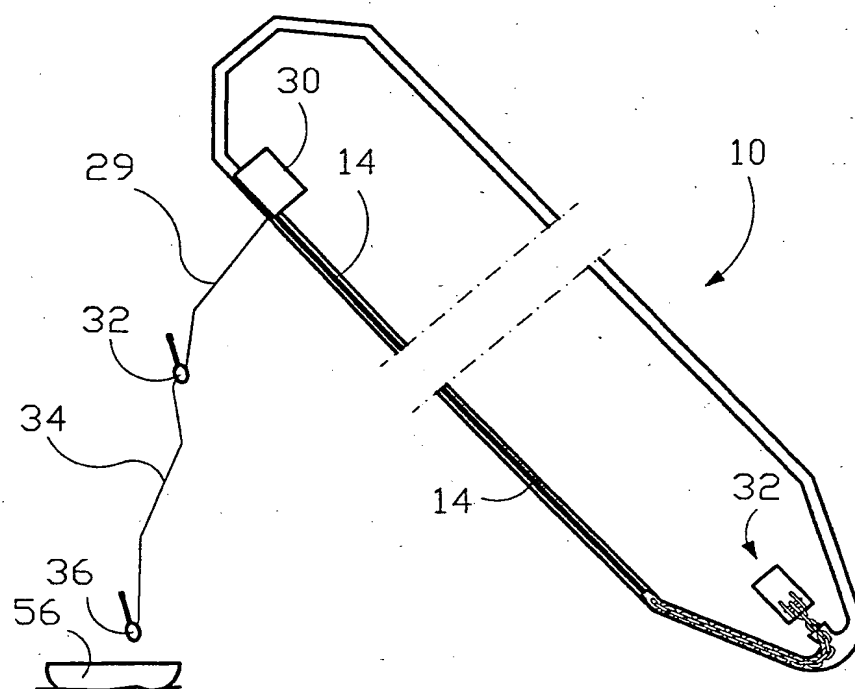


Fig. 4

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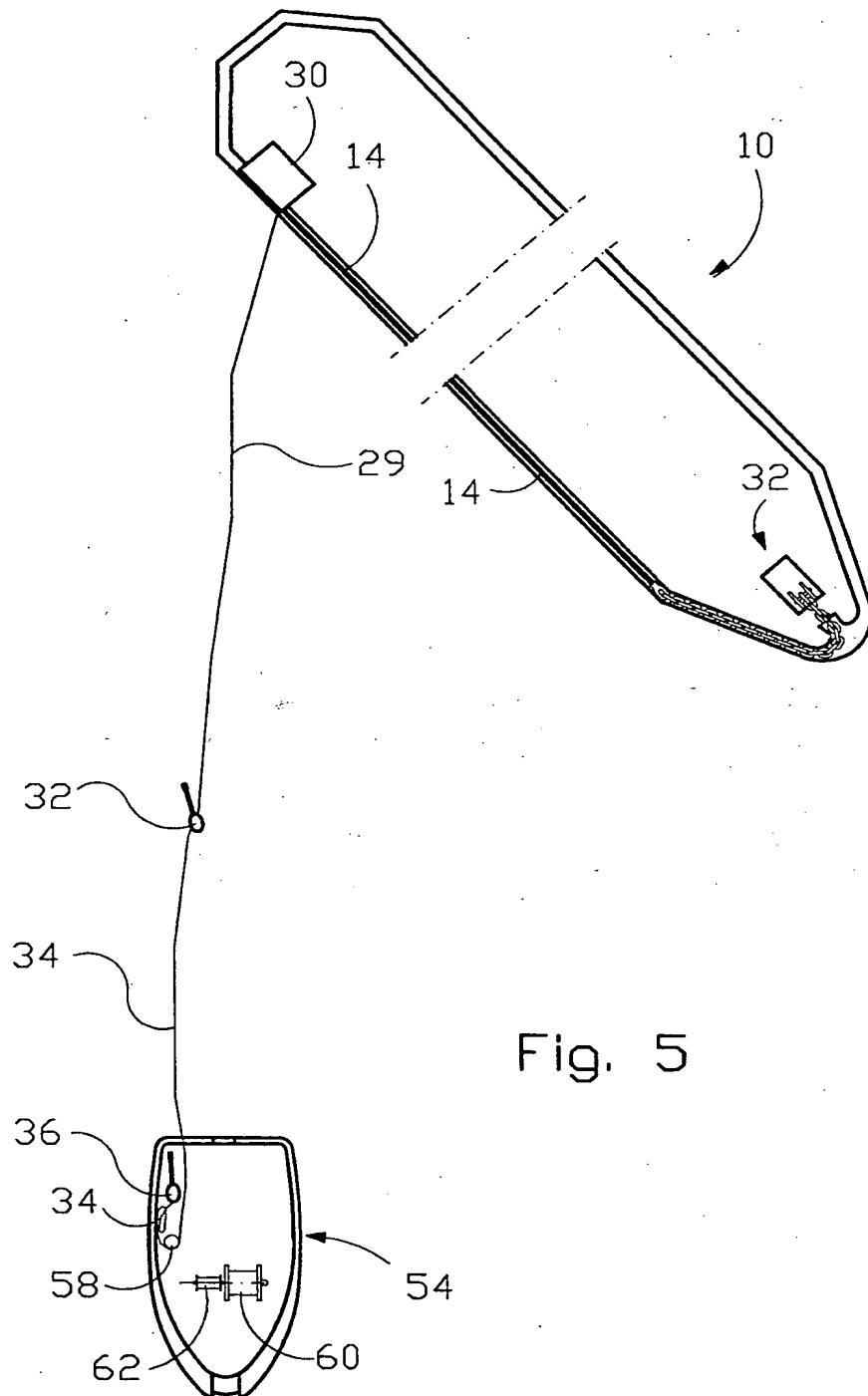


Fig. 5

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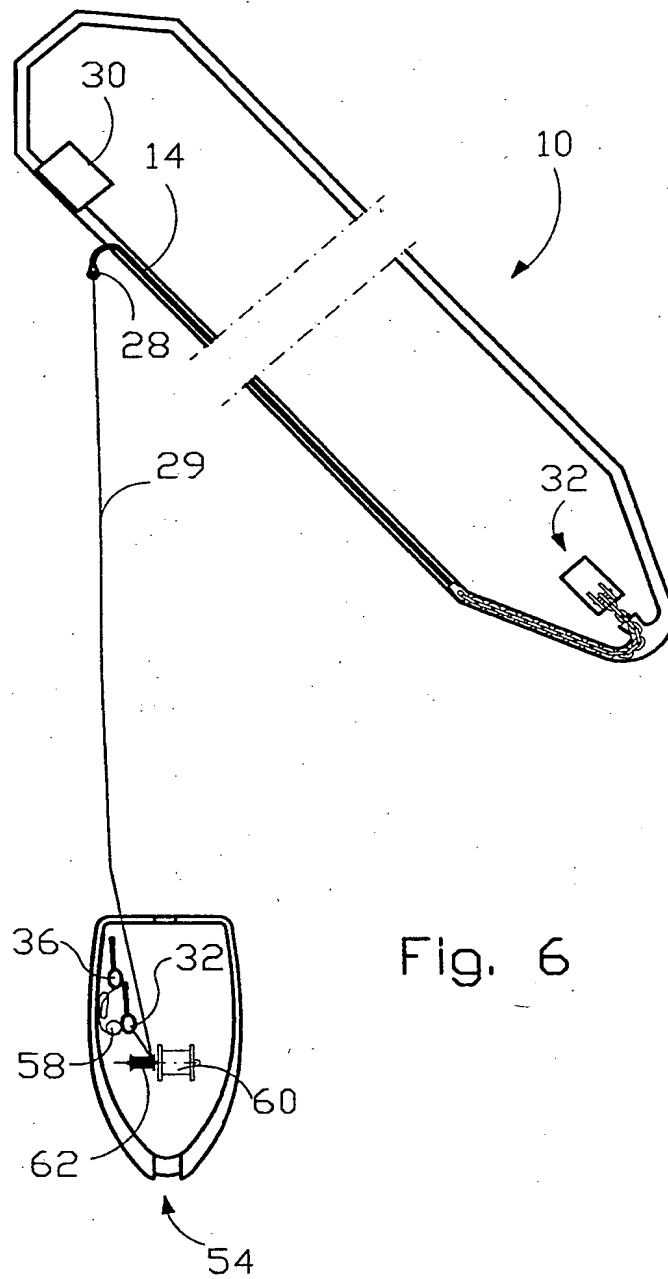


Fig. 6

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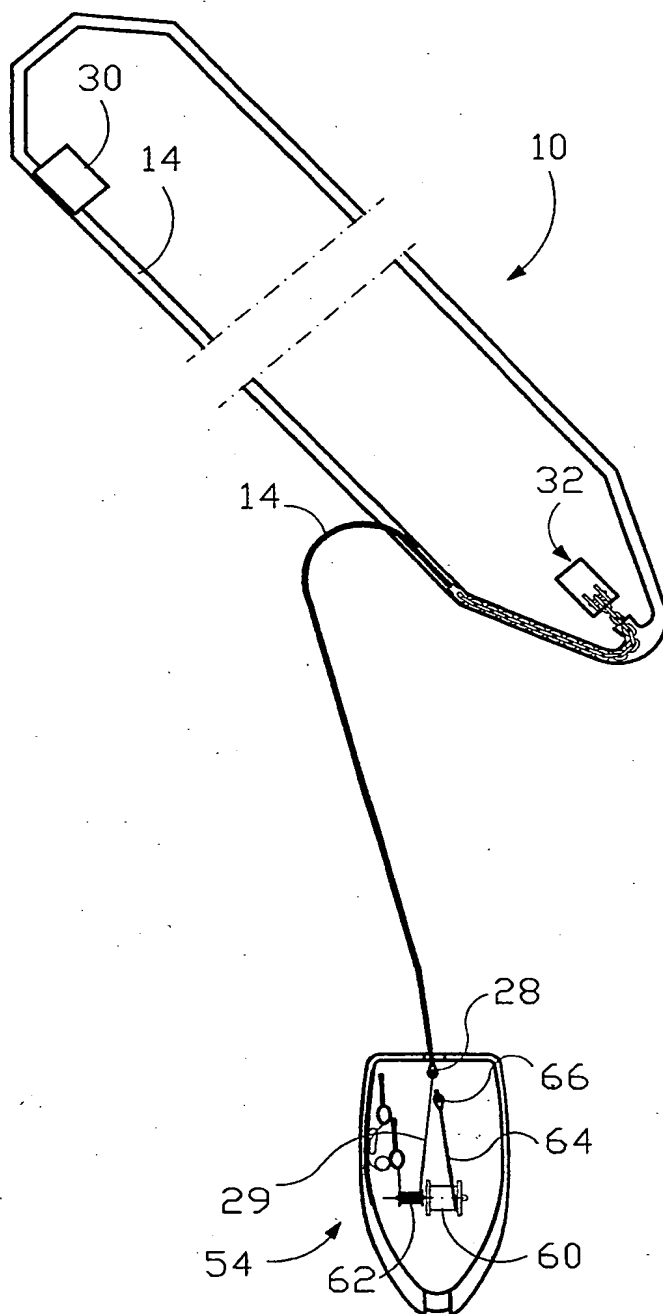


Fig. 7

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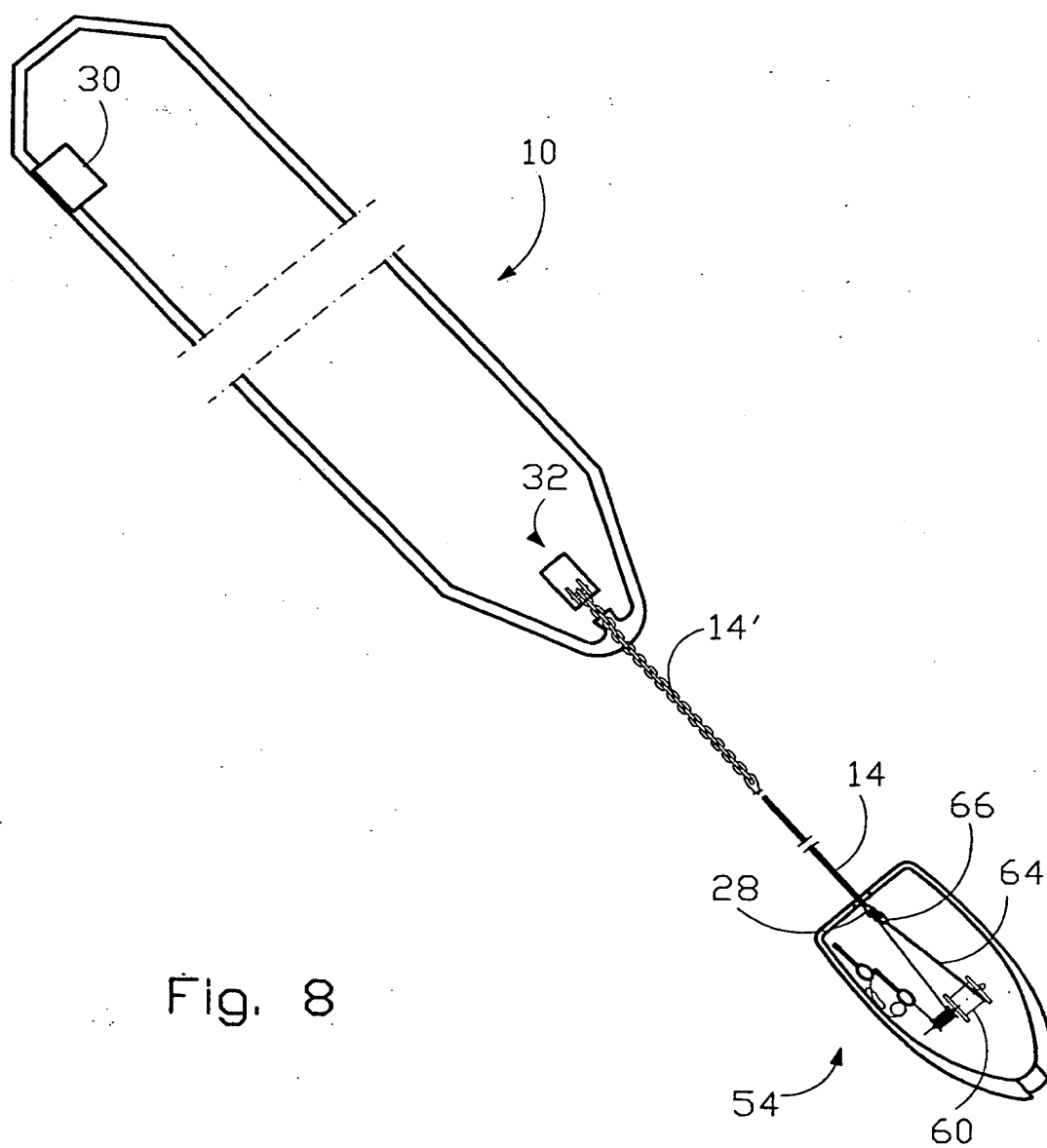


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NO 99/00355

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B63B 21/56
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B63B, B63C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9513958 A1 (RAPP BOMEK A/S), 26 May 1995 (26.05.95)	1-9
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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